

WHAT IS CLAIMED IS:

- 1 1. A switchable optical filter comprising:
2 a first thin-film optical bandpass filter portion; and
3 a second thin-film optical bandpass filter portion, wherein both the first and second
4 thin-film optical bandpass filter portions are adjacent to each other and are parts of a single
5 integral structure, and wherein the first thin-film optical bandpass filter portion is thermally
6 tunable and is characterized by a passband that shifts as a function of temperature and
7 wherein the second thin-film optical bandpass filter portion is thermally non-tunable.
- 1 2. The switchable optical filter of claim 1, wherein the first and second thin-film
2 optical bandpass filter portions are integrally formed one on top of the other.
- 1 3. The switchable optical filter of claim 1, wherein the second thin-film optical
2 bandpass filter portion comprises a Fabry-Perot cavity.
- 1 4. The switchable optical filter of claim 1, wherein the second thin-film optical
2 bandpass filter portion comprises a plurality of cavities fabricated one on top of the other.
- 1 5. The switchable optical filter of claim 1, wherein the second thin-film optical
2 bandpass filter portion comprises an etalon that is characterized by multiple passbands
3 spaced from each other and wherein the passband of first thin-film optical bandpass filter
4 portion is thermally tunable over the multiple passbands of the etalon.
- 1 6. The switchable optical filter of claim 1, wherein the first thin-film optical
2 bandpass filter portion comprises a Fabry-Perot cavity.
- 1 7. The switchable optical filter of claim 1, wherein the first thin-film optical filter
2 portion comprises a plurality of cavities fabricated one on top of the other.
- 1 8. The switchable optical filter of claim 1 wherein the first thin-film optical bandpass
2 filter portion includes a heating element for controlling a temperature of the first thin-film
3 optical bandpass filter.

1 9. The switchable optical filter of claim 1 wherein the first thin-film optical bandpass
2 filter portion comprises a layer of amorphous silicon.

1 10. The switchable optical filter of claim 1 wherein the first thin-film optical
2 bandpass filter portion comprises multiple layers of amorphous silicon.

1 11. A switchable optical filter comprising:
2 a first thermally tunable thin-film optical bandpass filter portion;
3 a second thermally tunable thin-film optical bandpass filter portion, wherein both the
4 first and second tunable thin-film optical bandpass filters are arranged next to each other on
5 an optical path; and
6 a spacer separating and thermally isolating the first and second tunable thin-film
7 optical bandpass filter portions from each other so that either one of said first and second
8 optical bandpass filter portions can be thermally tuned independently of the other one of
9 them.

1 12. The switchable optical filter of claim 11 wherein the spacer is an air gap.

1 13. The switchable optical filter of claim 11 wherein the spacer is a solid dielectric
2 material.

1 14. The switchable optical filter of claim 13 wherein the spacer is made of silica.

1 15. The switchable optical filter of claim 11 wherein the first thermally tunable thin-
2 film optical bandpass filter portion is characterized by a first passband that shifts as a
3 function of temperature, said first thermally tunable thin-film optical filter portion including
4 a first heater element for controlling a temperature of the first thermally tunable thin-film
5 bandpass filter portion so as to control a location of the first passband.

1 16. The switchable optical filter of claim 15 wherein the second thermally tunable
2 thin-film optical bandpass filter portion is characterized by a second passband that shifts as a
3 function of temperature, said second thermally tunable thin-film optical filter portion
4 including a second heater element for controlling a temperature of the second thermally
5 tunable thin-film bandpass filter portion so as to control a location of the second passband.

1 17. The switchable optical filter of claim 15, wherein the first thermally tunable thin-
2 film optical bandpass filter portion comprises a Fabry-Perot cavity.

1 18. The switchable optical filter of claim 15, wherein the first thermally tunable thin-
2 film optical bandpass filter portion comprises a plurality of cavities fabricated one on top of
3 the other.

1 19. The switchable optical filter of claim 16, wherein the second thermally tunable
2 thin-film optical bandpass filter portion comprises a Fabry-Perot cavity.

1 20. The switchable optical filter of claim 16, wherein the second thermally tunable
2 thin-film optical bandpass filter portion comprises a plurality of cavities fabricated one on
3 top of the other.

1 21. A switchable optical filter comprising:
2 a first optical bandpass filter portion; and
3 a second optical bandpass filter portion, wherein both the first and second optical
4 bandpass filter portions are arranged adjacent to each other to form a single
5 interferometrically-coupled optical filter structure, and wherein the first optical bandpass
6 filter portion is tunable and is characterized by a passband that shifts as a function of a
7 control parameter and wherein the second optical bandpass filter portion is non-tunable.

1 22. The switchable optical filter of claim 21, wherein the control parameter is
2 temperature.

1 23. A switchable optical filter comprising:
2 a first tunable optical bandpass filter portion characterized by a first passband that
3 shifts as a function of a first control parameter; and
4 a second tunable optical bandpass filter portion characterized by a second passband
5 that shifts as a function of a second control parameter, wherein both the first and second
6 optical bandpass filter portions form a single integral interferometrically-coupled structure.

1 24. The switchable optical filter of claim 23, wherein the first control parameter is a
2 temperature of the first tunable optical bandpass filter portion and the second control
3 parameter is a temperature of the second tunable optical bandpass filter portion.

1 25. The switchable optical filter of claim 24 further comprising a spacer separating
2 and isolating the first and second tunable optical bandpass filter portions from each other so
3 that either one of said first and second optical bandpass filter portions can be tuned
4 independently of the other one of them.

1 26. The switchable optical filter of claim 25 wherein the first tunable optical
2 bandpass filter portion includes a heater element for controlling the temperature of the first
3 tunable optical bandpass filter.

1 27. The switchable optical filter of claim 26 wherein the second tunable optical
2 bandpass filter portion includes a heater element for controlling the temperature of the
3 second tunable optical bandpass filter.

1 28. An add/drop optical circuit comprising a plurality of switchable thin-film optical
2 filters each of which has a first optical terminal for receiving an optical signal, a second
3 optical terminal for outputting an optical signal that is reflected by that switchable thin-film
4 optical filter and a third optical terminal for carrying an optical add/drop signal, wherein the
5 switchable thin-film optical filters of the plurality of switchable thin-film optical filters are
6 connected in series via the first and second optical terminals of the plurality of switchable
7 thin-film optical filters and wherein each of the switchable thin-film optical filters of the
8 plurality of switchable thin-film optical filters comprises a thermally tunable thin-film optical
9 bandpass filter portion having a passband that shifts as a function of temperature.

1 29. The add/drop optical circuit of claim 28 wherein each switchable thin-film
2 optical filter of said plurality of switchable thin-film optical filters further comprises a second
3 thin-film optical bandpass filter portion, wherein both the first and second thin-film optical
4 bandpass filters form a single integral filter structure, and wherein the second thin-film
5 optical bandpass filter portion is thermally non-tunable.

1 30. The add/drop optical circuit of claim 28 wherein each switchable thin-film
2 optical filter of said plurality of switchable thin-film optical filters further comprises:
3 a second thermally tunable thin-film optical bandpass filter portion; and
4 a spacer separating and thermally isolating the first-mentioned and second tunable
5 thin-film optical bandpass filter portions from each other so that either one of said first and
6 second optical bandpass filter portions can be thermally tuned independently of the other one
7 of them, wherein the first-mentioned and second tunable thin-film optical bandpass filter
8 portions and the spacer form a single integral filter structure.

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